A UNITED STATES DEPARTMENT OF COMMERCE PUBLICATION

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—improving the quality and safety of human life and prospects, as these are affected by the physical environment.

U.S. DEPARTMENT OF COMMERCE
Environmental Science Services Administration

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All of nature we perceive or can observe, that is our physical environment—a composite of earth, sun, sea, and atmosphere, their interactions, and the hazards they present. ESSA, the Environmental Science Services Administration, seeks to describe and understand the physical environment, to predict the state of the oceans and atmosphere, and to determine precisely the size and shape of the earth. ESSA is engaged also in research to strengthen and expand the Nation's capabilities in telecommunications. Achievement of those objectives is basic to our efforts to defend life and property against the hazards of nature, and to tap and conserve the resources of the environment.

ESSA was created in July 1965 within the U. S. Department of Commerce. Its formation brought together the functions of the Weather Bureau, Coast and Geodetic Survey, and Central Radio Propagation Laboratory. The combination of these functions provided, for the first time in a single agency, the talent, equipment, and responsibility needed to conduct a systematic study of the total physical environment.

ESSA gathers, processes, and issues information on weather conditions, river water height, coastal tides and currents, movement of ocean currents, the structure and shape of ocean basins, seismic activity, the precise size and shape of the earth, and conditions in the upper atmosphere and space. ESSA maintains warning systems against hurricanes, tornadoes, floods, and seismic sea-waves, and other environmental hazards, and is working to develop techniques of earthquake prediction. ESSA employees, in the United States and elsewhere around the world, man geophysical observatories, communications systems, and environmental research laboratories. Their equipment reflects a new technology of survey ships and instrumented aircraft, computers and artificial satellites.

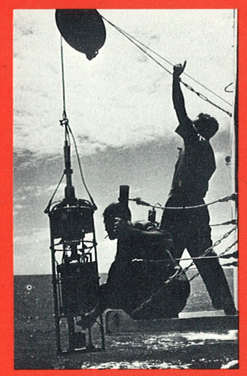
Through science, ESSA will improve environmental services available today and develop the services man will need tomorrow—to enhance the human condition as it is affected by the physical environment.

Environmental Science Services

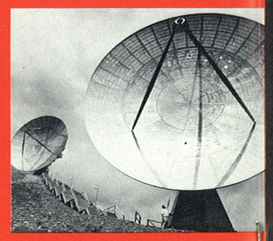
ESSA's services are principally concerned with operational programs which describe the physical environment and predict its future states. These services, and the applied research pertaining to them, are centered in the Weather Bureau, Coast and Geodetic Survey, Environmental Data Service, and National Environmental Satellite Center.

THE WEATHER BUREAU reports the weather of the United States and its possessions, provides weather forecasts to the general public, issues warnings against tornadoes, hurricanes, floods, and other weather hazards, and records the climate of the United States. In addition to this basic weather service, the Weather Bureau develops and furnishes specialized weather services which support the needs of agricultural, aeronautical, maritime, space, and military operations. The services of the Weather Bureau are supported by a national network of surface and upper-air observing stations, aircraft, satellite systems, communications, and computers. Some 300 Weather Bureau offices in cities across the land maintain close contact with the general public, to ensure prompt and useful dissemination of weather information.

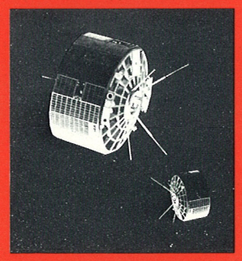
THE COAST AND GEODETIC SURVEY prepares nautical and aeronautical charts that promote the safety and efficiency of marine and air navigation, and conducts surveys to develop and maintain the precise geodetic control network essential to mapping and engineering projects. The Survey's programs in geophysics include measurement of gravity and determinations of the earth's size and shape. Geophysical observatories, mobile field parties, and a worldwide network of seismograph stations provide the data used by the Survey in monitoring earthquake activity and variations in the earth's magnetic field—and in issuing seismic sea-wave warnings to Pacific nations. The Survey is also active in photogrammetry and satellite geodesy. Oceanic operations include hydrographic surveys, marine gravity and magnetic surveys, and measurement of tides and currents; a 14-ship fleet conducts hydrographic surveys, and supports the programs of ESSA's Research Laboratories.

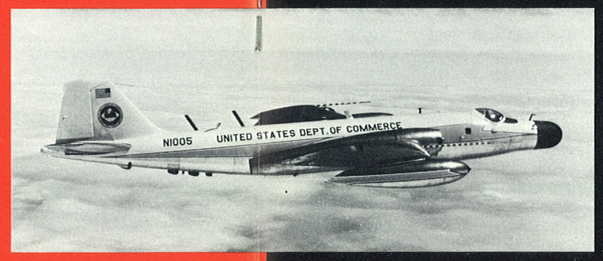


THE ENVIRONMENTAL DATA SERVICE collects, processes, archives, publishes, and issues environmental data gathered on a global scale. The Service maintains data centers for geodetic, geomagnetic, seismological, climatological, and other geophysical information, providing a single source of readily available environmental data to specialized and general user groups. To provide effective data support, the Service is active in development of advanced data storage and retrieval methods and computer applications.



THE NATIONAL ENVIRONMENTAL SATELLITE CENTER plans and operates environmental satellite systems, gathers and analyzes satellite data, and develops new methods of using satellites to obtain environmental data. At present, the Center operates the TIROS Operational Satellite (TOS) weather system, which employs ESSA (Environmental Survey SAtellite) vehicles to monitor global cloud cover. As the ESSA series matures, sensors will be added to measure additional atmospheric characteristics, and to provide data on solar, ionospheric, oceanographic, and other geophysical phenomena.





Environmental Sciences Research

ESSA's Research Laboratories conduct the fundamental investigations needed to improve man's knowledge of the physical environment, and to develop the more advanced services he will need tomorrow. These programs are conducted within the Research Laboratories and as sponsored projects at private institutions and in industry.

THE ATMOSPHERIC PHYSICS AND CHEMISTRY LABORATORY performs research on processes of cloud physics and precipitation and the chemical composition and nucleating substance in the lower atmosphere. It is ESSA's major focus for design and conduct of laboratory and field experiments toward developing feasible methods of practical, beneficial weather modification.

THE AIR RESOURCES LABORATORIES conduct research on diffusion, transport, and dissipation of atmospheric contaminants using laboratory and field experiments to develop methods for prediction and control of atmospheric pollution.

THE GEOPHYSICAL FLUID DYNAMICS LABORATORY conducts investigations of the dynamics and physics of geophysical fluid systems to develop a theoretical basis, by mathematical modeling and computer simulation, for the behavior and properties of the atmosphere and oceans.

THE NATIONAL SEVERE STORMS LABORATORY conducts studies to improve the understanding of tornadoes, squall lines, and other severe storms; to provide improved capabilities of predicting such events; and to develop better methods of early detection and identification.

THE ATLANTIC OCEANOGRAPHIC AND METEOROLOGICAL LABORATORIES conduct research toward a fuller understanding of the structure and dynamics of the global ocean and its interactions, study hurricanes and other tropical weather phenomena, and conduct experiments in hurricane modification.

THE PACIFIC OCEANOGRAPHIC LABORATORIES conduct research toward a more complete description of the global ocean and its interactions, and investigate the generation and terminal effects of tsunamis.

THE EARTH SCIENCES LABORATORIES conduct research in geomagnetism, seismology, geodesy, and related earth sciences, seeking fundamental knowledge of the internal structure and accurate figure of the earth and the geophysical processes which produce earthquakes.

THE INSTITUTE FOR TELECOMMUNICATION SCIENCES serves as the central Federal agency for the conduct of research and services on the propagation of radio waves, on the electrical properties of the earth and its atmosphere, on the nature of radio noise and interference, on information transmission and antennas, and on methods for the more effective use of the radio component of the Research Laboratories.

THE WAVE PROPAGATION LABORATORY acts as a focal point for research directed toward the extension of telecommunication to higher frequencies, and the development of new methods for remote sensing of man's geophysical environment.

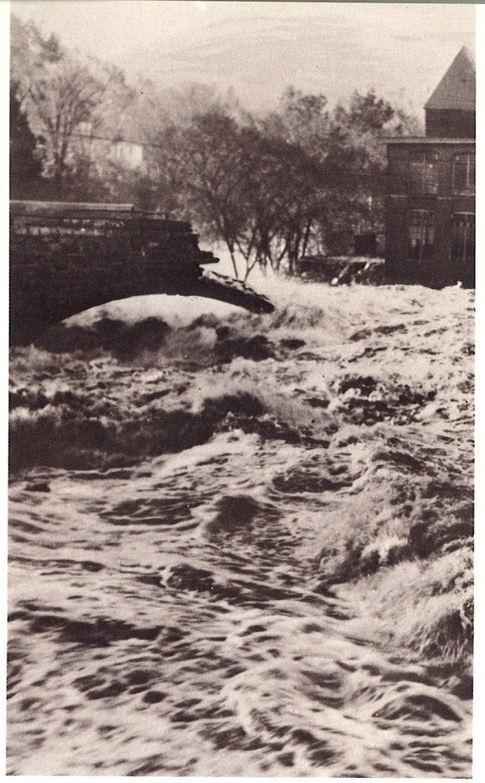
THE AERONOMY LABORATORY studies the condition, structure, and physical and chemical processes of the ionosphere and exosphere of the earth and other planets. Its programs include theoretical, laboratory, rocket, satellite, and ground based studies.

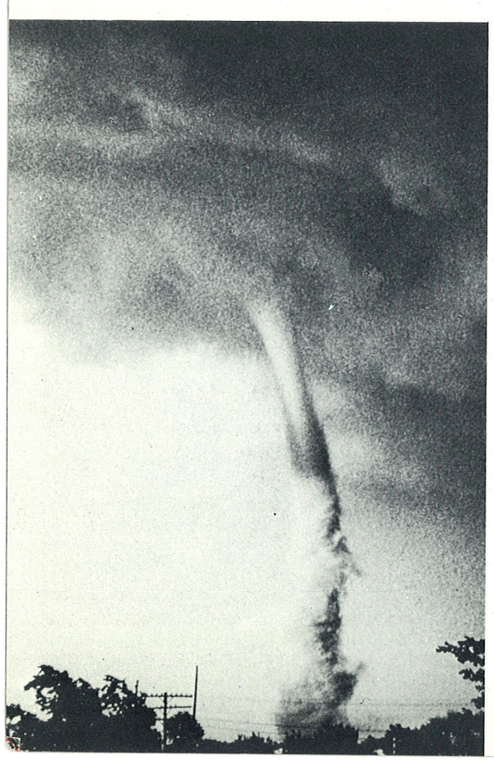
THE SPACE DISTURBANCES LABORATORY conducts research on the nature of space disturbances, provides forecasts of these disturbances, and studies their behavior, the mechanisms producing them, and their consequences to man's activities. The Laboratory also investigates methods of continuously monitoring those characteristics of the space environment related to early detection and reporting of important disturbances.

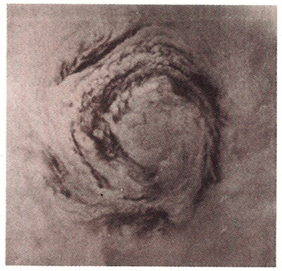
THE RESEARCH FLIGHT FACILITY meets the requirements of ESSA for atmospheric and other environmental measurements from aircraft, and for outfitting and operating aircraft specially instrumented for environmental research.

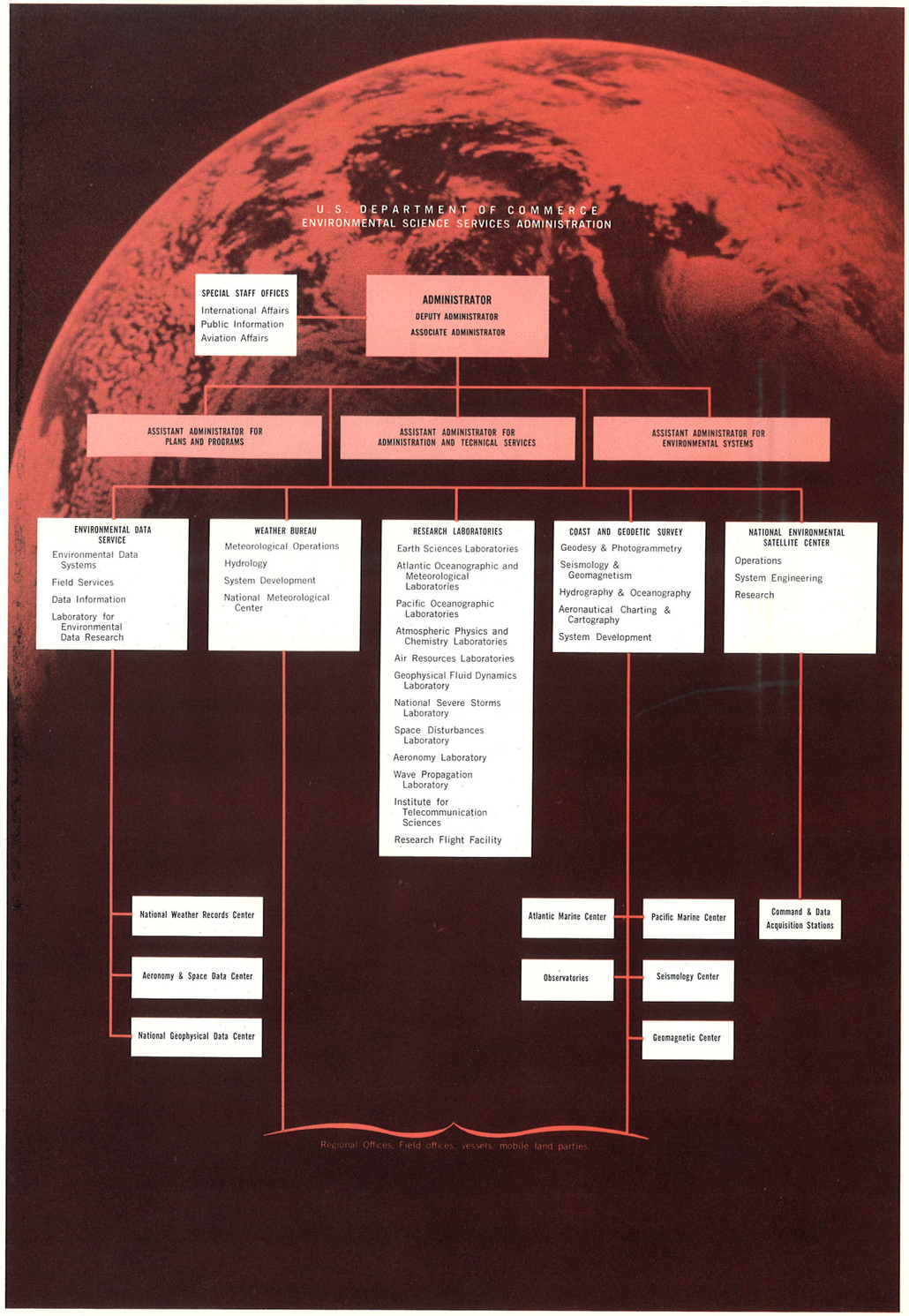
Environmental Hazards Warning Systems

ESSA is taking major steps toward improving its environmental hazards warning systems, to reduce the toll of life and property exacted by natural catastrophe. The present tornado, hurricane, flood, severe storm, and seismic sea-wave warnings systems are continually improved, to speed detection of potentially destructive events. Research in ESSA attempts to develop ways of recognizing these events before they become destructive—and ways of modifying or controlling them. Earthquakes, which at present must occur to be detected, are under study to determine whether they have recognizable precursors, and whether their destructive effects can be accurately forecast.







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